We must know whether the variable star belongs to a binary system, and if so, whether its period of orbital revolution coincides with its period of light-change. We must know also whether its velocity curve is a reflection of its light curve, or whether it is a modified sine curve, as is the case with eclipsing variables. Furthermore, we must know whether maximum light coincides with maximum velocity of approach and whether there is any change in the nature of the light which we receive from the system. On all these points we must have definite knowledge before we can decide in favor of one or the other of the above-mentioned theories, or must seek an altogether new explanation. We await the evidence which a star bright enough for spectroscopic study and analysis can give us.

THE SPECTRUM OF *NOVA GEMINORUM* NO. 2.

By W. H. Wright.

The spectrum of *Nova Geminorum* No. 2 was observed during March, April, and May. Unfortunately the weather was cloudy for several days after the announcement of the discovery of the star, so that it was impossible to observe it before March 16th. Between that date and May 27th forty-one spectrograms were secured.

The observations were made with the single prism spectrograph attached to the 36-inch refractor, and with the 2-prism quartz spectrograph used with the Crossley reflector. Taken together, they cover the region included between 3250A and 6850A. During the period which they cover, many remarkable changes occurred in the spectrum. In this brief note it will be impossible to more than touch upon some of these, a fuller discussion being reserved for a forthcoming paper.

The characteristic features of the spectrum as photographed on March 16th, three days after the announcement of the discovery of the star, were continuous spectrum crossed by the usual bright and dark bands and by some dark bands not seen in previous novæ. The hydrogen series was represented by bright bands accompanied on their more refrangible edges by broad dark lines. On March 20th these dark companion lines

were still single, but two days later these were strongly doubled, while on March 30th they were found to be triple, the more refrangible component in each case having separated into two.

The hydrogen bright bands and some of the others showed considerable structure, but the band at 465 was usually hazy and shapeless, and was crossed here and there by dark bands.

Early in May the bright bands characteristic of the nebular spectrum began to appear. On the second of that month none of these except possibly 5007A was photographed, while on the ninth 5007A and 4959A were strongly recorded on a photograph of the visual region. A spectrogram of the photographic region made on May 12th showed 4363A, 4959A and 5007A bright. The earlier spectrogram, that of May 9th, did not include the position 4363A, so that it may be assumed that the line of this wave-length was present on that date.

The last photograph of the series was secured on May 27th. The plate is a little weak on account of the low altitude of the star at that time. The nebular lines are present on this spectrogram, but are not appreciably stronger than on the 12th of the month.

NOTE ON THE PLANETARY NEBULÆ.

By H. D. Curtis.

These objects form a very interesting subdivision of the great nebular class. Though sharply separated from the spiral "white" nebulæ in general form and in spectrum, some confusion arises when the attempt is made to define exactly those qualities which entitle a nebula to the name "planetary." A typical planetary nebula is relatively small, its outer boundaries are very distinct and clearly marked, there being no gradual falling off at the edges, but instead a very abrupt boundary line. They are generally very bright, and for some of them an exposure of ten seconds with the Crossley reflector is ample to show the central star, which almost always exists in this type, and the surrounding nebulosity.

Some larger nebulæ have been included in this class, such as